



SMARTER

KEEPING YOU INFORMED OF DEVELOPMENTS IN THE ELECTRONICS INDUSTRY

OCTOBER 2011

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Welcome to our newsletter



Chairman thanking everyone for attending the conference

Our Chairman and Committee would like to thank all those who participated in our recent Two Day Annual Conference held at the Oxfordshire venue. We hope all delegates found the event stimulating and entertaining. To our speakers we thank you for an interesting two days packed with excellent information. The support from our many exhibitors is always appreciated.

Since the event we have received many favourable comments and we were especially delighted to receive this note from our regular 'star' performers Doug Pauls and Dave Hillman from Rockwell Collins USA.

"Dave and I had a very enjoyable trip and found the SMART conference to be worth a trip across the pond. We found the papers given to be pertinent to today's issues and well presented by the authors. The conference was well organized and well run. From our standpoint as Americans, it is beneficial to see our industry from a more global perspective, and to see that everyone wrestles with

common issues. As the aerospace/military industry is largely exempt from lead free issues, we can learn a great deal from those who have worked with the problem longer and more intimately than we have. We look forward to this conference each year and feel it offers a valuable resource to those who cannot attend the larger shows in the US, Pacific Rim, or Productronica." **Doug Pauls**

We thank our two scribes who kindly reported on the conference proceedings: Pete Starkey (iConnect007) and John Ling (EIPC website). Some of Pete's report is included in this newsletter and his full text is on our website.

Finally we congratulate our Vice Chairman, Graham Naisbitt, who recently received an IPC Committee Leadership Award.

Mike Judd

SMART Launches New Brochure!

Click here to download a copy now!



Mike Konrad from Aqueous Technologies was voted *Best Paper* by delegates at the two day annual conference - see pages 2 and 3 for more information!



SMART Group Conference 2011



Speakers at Day 1 of the conference

DAY 1

An excellent venue, a stimulating programme on topics of current industry concern, high-calibre presenters from the US and Europe, an attentive audience - recipe for another outstanding SMART Group Conference at the Oxfordshire Golf Club in Thame, UK. Introduced by SMART Chairman Keith Bryant, the 2011 event focused on area array design, assembly, reliability, cleaning and conformal coating, with speakers from the USA and Europe.

Returning to the SMART Conference for the third successive year by popular demand, Dave Hillman chose for his keynote presentation "The Great Debate: Underfill, or Edge Bonding or Corner Bonding of BGAs for Greater Reliability", presenting the results of his current studies at Rockwell Collins.

Hillman's presentation prompted a lot of questions from the many high-reliability assembly experts in the audience and the discussion on reworkability and other considerations carried on well into the coffee break.

Reliability is key when you manufacture guided weapons! Charles Cawthorne from MBDA Missile Systems gave a practical user-view of area array assembly and inspection requirements for high-reliability applications. MBDA had first used BGAs in the late 1990s, and they were now an integral part of many of their assemblies.

MBDA currently prohibited the use of lead-free BGAs or mixed-metallurgy assembly; their process was exclusively tin-lead and if no alternative component were available then lead-free BGAs would be re-balled. No reliability issues had been found to result from re-balling. Cawthorne also described methods for effective management of plastic BGAs and discussed some aspects of conformal coating and underfill.

The phenomenon of "Pad Cratering" was clarified in the presentation of Kamran Iqbal from Nordson Dage, reporting work carried out in collaboration with Universal Instruments.

Pad cratering occurred when the laminate underneath a BGA pad failed mechanically and in the worst case the pad could become detached, leaving a "crater" behind it.

The first presentation of the afternoon session came from Simon-Peter Santospirito of Kingston Computer Consultancy, co-ordinator of the European FP7 collaborative microBGA Project, whose objective was to become competitive with and independent from Chinese, Japanese and North American manufacturers. Fundamental to the manufacture of microBGAs was a supply of 50-micron solder balls, at a rate of 500,000,000 per day, at high CpK value by a reliable and affordable technology, and the project had set out to develop a production technique and to disseminate the knowledge through European member organisations, of which SMART Group was one.

Back to the practical realities of high-reliability assembly, Dave Shaw from Aero Engine Control Systems explored the subject of post-reflow cleaning with a presentation on semi-aqueous cleaning of low-stand-off devices on avionics assemblies, and the challenges of balancing cost, capacity and health-and-safety issues against process capability in a batch-cleaning context.

Dave Hillman having opened the day's proceedings, it somehow seemed natural for him to return and deliver the final paper. This time his topic was BGA voids - a final discussion on inspection standards, void size and reliability, presenting his latest findings and declaring these to be "The last will and testament of BGA voids!"

Hillman's presentations can usually be relied upon to initiate a good debate and this one was no exception. Several members of the audience were keen to air their own theories and share their experiences, and a splendid first day's programme ended with a session of lively and very constructive interactive discussion.

Pete Starkey SMART Group Technical Committee and I-Connect007

SMART Group Conference 2011



Speakers at Day 2 of the conference

DAY 2

An eager audience re-convened at the Oxfordshire Golf Club in Thame, UK, and Technical Committee Chairman Sue Knight got the second day of the 2011 SMART Group Conference under way, introducing an agenda focused primarily on cleaning and coating electronic assemblies.

For once the Doug and Dave double-act gave individual performances! Dave Hillman having been the star of the Day 1 programme, he heckled enthusiastically from the audience as Doug Pauls, his colleague from Rockwell Collins, took the rostrum to discuss the hazards of using conformal coating as an underfill. A widely-held view of traditionalists was that "you have to coat every ball on a BGA with conformal coating or you will fail humidity testing every time", and Pauls set out to demonstrate this was not the case.

Dr. Mike Bixenman, Kyzen's Chief Technology Officer, led the development of the recently published IPC-CH-65B Handbook "Guidelines for Cleaning of Printed Boards and Assemblies" for which both he and Doug Pauls had received awards at IPC Mid-West a few days before the SMART Conference. Bixenman gave a polished presentation on the potential impact of the new handbook, and countered the inevitable question "How clean is clean?" by asking "How clean is clean enough?"

The next speaker, Vladimir Sitco from cleaning equipment manufacturer PBT in Czech Republic, described the development of a practical method for measuring the efficiency of cleaning processes that could be used on the shop floor to facilitate process optimisation. He began by reviewing the limitations of current methods, which could be over-complicated and tended to be insensitive to hidden residues, particularly when they were trapped under low-stand-off components.

Case studies in conformal coating: problems and remedies – potentially mind-numbingly dull? Not when Doug Pauls is recounting his experiences with Rockwell Collins Advanced Operations Engineering Group, where he and Dave Hillman provide an expert service for manufacturing, materials or

process problems. "We get to see some weird stuff and make sure nothing is shipped that does not meet our quality standards."

Martin Wickham, from the National Physical Laboratory, described a quantitative adhesion test for conformal coatings. The challenge was how to reinforce the coating to enable it to be gripped and peeled off at an angle of 90° in a tensile testing machine, and the answer lay in embedding a strip of fabric into the coating.

In the second part of his presentation, Wickham gave an update on the NPL whisker mitigation joint-industry project.

Graham Wilson from Indium looked at some of the practical aspects of coating over flux residues, and assessing the compatibility of solder paste residues with conformal coatings. Perceived benefits of coating included harsh atmosphere protection, improved humidity resistance, splash protection and increased electrical isolation.

Probably the most interesting paper of the day was the last – Mike Konrad from Aqueous Technologies, with an excellent presentation entitled: "Practical Cleaning Issues for No-Clean Flux, and How to Have a Successful Cleaning Process." Ironically, the most common flux removed at present was in fact no-clean, and 55% of assemblers surveyed said that they cleaned no-clean assemblies!

"How clean is clean?" – the same question had been asked several times during the conference, and usually the answer had begun: "It depends..." Konrad countered with another question: "What is the cost of failure?", and asked whether people cared the same whether a games console or an implantable defibrillator failed.

Closing what had been a truly excellent conference, Sue Knight remarked upon the high level of audience participation and interaction; the speakers unanimously agreed that it had been a most satisfying experience to present to intelligent listeners who were genuinely interested in learning and were not shy in asking questions and sharing their own experiences and opinions.

Pete Starkey SMART Group Technical Committee and I-Connect007

SMART goes beyond merely Electronics...

SMART Group was born in 1984 and stands for Surface Mount And Related Technologies. Throughout all of the Groups' early years, the emphasis for industrial help and dissemination was aimed at electronics production and it had a particular emphasis on promoting Surface Mount Electronics Production. It still does. Despite surface mount electronics being the mainstream production method today, there are many needs for seminars, webinars and help in all sorts of guises to guide users to the best methods and controls in production. Probably this will continue for many years to come. Topics of interest to the membership such as Traceability or NPI exemplify this.

The Related Technologies part of the group's portfolio is now becoming more interesting for many users of the Group's services. SMART became involved in European Union projects in 2004 when the EU promoted the LEADOUT project to show how to eliminate lead from electronics. This project was based on electronics, but it linked SMART to the EU and the group

is now involved in other EU projects that have allowed it to diversify – in some cases a long way from electronics as witnessed by TestPEP which concentrates on checking welds in plastic pipes, or Ship Inspector which aims at using Ultra-sonic waves to detect defects in ships' hulls without needing to berth in dry dock. SMART Group has used these experiences to truly offer a service to the Related Technologies part of industry.

Two areas of interest that have their roots in electronics but fall into the Related Technologies sphere of influence are Printed Electronics and Alternative Energies. The electronic controls of wind or wave energy sources use standard production procedures and are covered by the SMART Group's Surface Mount activities but the solar energy (photovoltaic) and fuel cell businesses follow slightly different paths to "mainstream" electronics. Printed electronics and alternative energies also have links to "nano-technology" and so the SMART Group is actively pursuing these, and others, in order to offer a service to users on the same lines as before but with slightly different technologies. The SMART Group aims to be the premier disseminator of skills and information for these newer technologies without sacrificing its roots in surface mount electronics. As the months proceed, various seminars, webinars or events for these technologies will be organised but the Group is also always very keen to hear from its membership so that events can be organised that reflect the current focus of the members. SMART Group will endeavour to fulfil all of its existing remits and add newer ideas and technologies as they become interesting to the membership.

Related Technologies are stimulating and appropriate to British industry.

Peter Grundy SMART Group Committee Member

Graham Naisbitt Receives IPC Committee Leadership Award

Graham Naisbitt was honoured for his joint leadership (with Joseph Rousseau) of the 7-11 Test Methods Subcommittee that updated and reorganised IPC-TM-650, Test Methods Manual."

Denny McGuirk commented at the presentation: "Maintaining oversight for 307 test method procedures is no simple task. The IPC 7-11 Test Methods Subcommittee has undertaken the ambitious goal of identifying all IPC-TM-650 Test Methods that are five years or older and requesting method updates or reaffirmations from originating task group members. In cases where test methods have become orphans without an existing originating task group, the 7-11 subcommittee is recruiting standards groups to adopt such test methods and incorporate references and call-outs to them in their standards, preserving the relevance of these test methods.





NEW Announce Plans for 2012!

11-18th April

New Events Ltd, the organisers of National Electronics Week 2012 (NEW:UK) are pleased to announce some significant changes to their 2012 event which is set to change not only the concept of the event but bring some exciting new dynamics to the show which will ensure exhibitors are part of something that is around 9,000 square metres larger than Productronica 2011 is projecting.

The show will share an entrance with the Independent Power, Energy and Electricity and Electrex Exhibition, additionally then we will co-locate with Drives and Controls, Ispex, Plant and Asset Management and Air-Tech who will take Halls 3 and 3a. And to finish off this co-locate the MACH Exhibition (the largest machinery Manufacturing event in the UK) will take Halls 4 and 5. Therefore all events will collectively cover over 37,000 square metres of exhibition space and will create the largest UK manufacturing event in 2012.

NEW:UK has chosen its date line to coincide with the 2 busiest days of the other exhibitions where out of the 34,000 visitors expected to the NEC that week over 20,000 will be onsite during the NEW:UK open period. Additionally there will be more than 1,000 exhibiting companies in the 7 exhibitions – all who could be potential new customers for the NEW:UK exhibitors. These 7 events create a close synergy with NEW:UK and the show organisers are all working very closely together to ensure cross-promotion of all events and to create a strong industry gathering next year.

NEW:UK will be working closely with the relevant trade press and with The SMART Group and other major trade associations to get this positive message out to industry.

It has also got the support of the UKTI who is organising an International Brokerage Zone on the show floor which has been designed to target key international companies to visit the UK and have one to one meetings with industry and they want feedback from NEW:UK exhibitors and visitors on who they should be targeting.

Join SMART Group and help influence your industry.

Please contact Tony Gordon, our Secretary at the office address:

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SMART GROUP EVENTS DIARY 2011

25th October 2011

Design for Manufacture – Webinar
Online *smart-e-webinar*

3rd November 2011

SMART Scotland Back to Basics – Inspection Techniques
BAE Systems Insyte, Hillend Dunfermline, Fife

17th November 2011

Silicon to Package incorporating the EU uBGA Project
Intel Ireland Ltd, Leixlip, Kildare

22nd November 2011

Understanding & Mitigating Against Tin Whiskers
Ford College, Loughborough University

6th December 2011

Test Strategies in Electronics *smart-e-webinar*
Online *smart-e-webinar*

SMART GROUP EVENTS DIARY 2012

25th January 2012

Handling Moisture Sensitive Components Without Failure
Stoke Mandeville Stadium, Aylesbury

23rd February 2012

Advances in PCB Assembly Technology
Henkel Ireland, Dublin 24

3rd May 2012

PCB Solderable Finishes Paste & Flux Compatibility
Henkel UK, Hemel Hempstead

10th May 2012

Lead-Free Experience Workshop – 6 Years On!
Enterprise Ireland, Dublin

Check all events on www.smartgroup.org/diary

UK EXHIBITIONS

15th-16th February 2012

Southern Manufacturing & Electronics,
Five Farnborough

17th-18th April 2012

NEW, National Electronics Week,
NEC, Birmingham